

Claim 11 was rejected for insufficient antecedent basis.

For the remaining claims, the independent claims 1 and 16 were rejected by the Examiner as being anticipated by the U.S. Patent No. 5,763,277 to Zhu. The Examiner also rejected some of the dependent claims based on references including the Taylor publication (Anal. Chem. 1992, vol. 64, 1741-1744).

Claims 1-18 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims of copending Application No. 09/887,871.

These rejections are respectfully traversed.

Summary of the Response

The specification has been amended to provide reference application no. Claim 11 have been amended to provide antecedent basis by correcting the claim dependency. Claims 1 and 16 have been amended to recite a widen detection section and the location of a detection zone in relationship of the transition of the widen detection section.

Summary of the Invention

The present invention is directed to detection system and a bio-separation system, in which the emitted radiation is axially detected along the separation medium. Specifically, the present invention is directed to detection system and a bio-separation system, in which the detection zone for optical detection of sample analytes is located at a widened zone along the separation channel. Referring to Fig. 2B in the present application, it is noted that as the

analytes flow from the separation channel 504 of capillary column 22 into the collar 10, the analytes remain subject to the applied potential. As a result, the analytes continue to maintain separation state (i.e., in the form of a series of separate analyte bands) as they migrate/flow past the detection zone 20. Some mixing or diffusion of the analytes may occur in the collar near the exit of the separation channel 504, but analytes “regroup” into separated state as they continue down along the collar 10 towards the detection zone 20. The detection zone 20 is preferably located at 100-500 x ID of the collar 10 from the transition to the widened zone, more like 225 times the ID, to provide sufficient distance for the analytes to regroup before detection at the detection zone 20. Because the diameter of the detection zone is larger than the diameter of the separation channel 504, the analyte bands are narrower in the axial direction. Thus the detection resolution can be improved as a result.

None of the cited references, either taken alone or in combination, teach or suggest the present invention.

Traversal of Rejections

Zhu does not teach or suggest that the detection zone could or should be located at a distance 100 to 500 times of the diameter of the widened section from the transition to the widened section, as required by the independent claims 1 and 16 as amended.

Zhu is silent in the written disclosure as to the location of the detection zone, much less disclose defining the detection zone to be at such distance from the transition. Fig. 3 in Zhu shows the fiber optic 3 inserted into the increased inner diameter 1d of the bore 2, with the tip within 1 time of the increased diameter 1d from the transition from the smaller diameter. Zhu

did not address the concern with mixing and diffusion and regrouping of analyte back into separated state.

Independent claims 1 and 16 as amended consequently are not anticipated by Zhu. It follows that all the dependent claims should also be patentable over Zhu.

Taylor does not make up for the deficiencies of Zhu. Taylor is not directed to axial detection of emitted radiation from the detection zone.

Provisional Double Patenting

Applicant submits that the claims in the present application are directed to detection of emitted radiation, not incident axial excitation radiation as in the pending claims in copending application no. 09/887,871. The claims in both copending applications could not be obvious over one another. The Examiner has not provided sufficient basis to support his view that it would have been obvious to one of ordinary skill in the art to incorporate the radiation in certain directions in order to optimize the measurement of the signal, when the present invention is directed to detection of emitted radiation, not incident radiation.

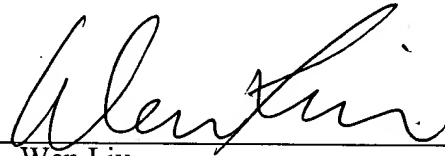
In the event that the Examiner should maintain the provisional double patenting rejection, Applicant added a new claim directed to axial incident of excitation radiation. Such should not be subject to restriction requirements in light of the double patenting rejection.

Conclusion

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.

Respectfully submitted,

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Wen Liu
Registration No. 32,822

LIU & LIU LLP
811 W. Seventh Street; Suite 1100
Los Angeles, California 90017
Telephone: (213) 830-5743
Facsimile: (213) 830-5741